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E-Procurement: Current Issues & Future Challenges

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E-PROCUREMENT: CURRENT ISSUES & FUTURE CHALLENGES

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Abstract

E-procurement has been identified as an area of B2B e-commerce where IS-enabled transformations of business processes and practices are likely to yield significant benefits. In this paper we present the findings from a recent survey of e-procurement in Australia. The survey is designed around the OECD model of e-business adoption and provides a picture of the readiness, intensity and impact of e-procurement in Australian organisations. The survey findings indicate that e-procurement has transitioned from a largely operational concern and now takes a more strategic position in organisations. E-procurement implementations have increased in both reach and scope, with more organisations implementing systems that span the whole enterprise, encompassing a greater range of procurement functions and activities. However, whilst progress has been made a number of challenges still remain. None of the respondents who had implemented e-procurement reported major or significant benefits. Moderate benefits were realised with respect to improved supply chain integration, reduced employee overhead and improved supplier sourcing. In this paper we present the findings of the 2006 Australian National e-Procurement Survey. We discuss the findings and their relation to previous surveys and studies and outline implications for future research on IS-enabled innovations in procurement.

Keywords: e-procurement, IS-enabled innovations, socio-technical change, information management.

1 INTRODUCTION

Growth in business-to-business e-commerce remains strong as information and communications technologies (ICTs) continue to transform organisations' interactions with their suppliers and customers (Mullaney, 2003; European Commission, 2005a). For example, in 2004-05 the proportion of Australian businesses placing orders via the Internet continued to increase (33%), growing by 2% from 2003-2004 (31%) (ABS 2006). Supply-side activities such as electronic procurement (e-procurement) have been identified as a key area where information systems (IS)-enabled innovations are likely to yield significant benefits for organisations (European Commission 2005b 2006, Laub, 2001).

Whilst the drivers and *potential* benefits and transformations of e-procurement are well documented, the ongoing impact of these changes on organisations is less well understood. Most organisations seek to improve procurement processes and reduce procurement costs, however there are other motivations. Adoption profiles and reasons for adoption vary, as do the desired benefits (Williams and Morello 2004). For example, whilst there are similarities between public and private sector e-procurement contexts in terms of deriving economic value and quality there are significant differences in terms of social welfare implications (Hardy and Williams, 2005).

Definitions of e-procurement vary in both scope and depth; ranging from a narrowly defined technology-focused view through to a much broader business focused view. Most e-procurement research studies place technology and applications centre stage focusing on the adoption and implementation of specific technology solutions such as integrated catalogues, reverse auctions or e-marketplace systems. Whilst such studies provide important insights into technology adoption they tend to investigate a limited range of procurement activities. Their focus is primarily on requisitioning (i.e. selection of products, authorisation, order placement etc.) and the operational/transactional aspects of e-procurement. The emphasis is on the use of technology to substitute or enhance transactional activities in order to gain operating efficiencies (Essig and Arnold 2001, Osmondbekov et al. 2002). Other research studies take a broader business oriented view of e-procurement reflecting the shift in the role of procurement from a back-office, operational and reactive function to one that is more strategic, proactive and transformative. The focus of these studies is on the use of IS-enabled innovations in procurement to enable value creation and collaborative commerce. This broader, business oriented view encompasses a wider span of activities ranging from strategic sourcing and supplier relationship management through to settlement and payment of goods. It describes the end-to-end process in terms of a *source-to-settle procurement lifecycle* (Knudsen 2002, Archer and Yuan 2000, Carfax-Foster 2003). The focus is on both the strategic and operational aspects of e-procurement. That is, e-procurement is viewed as "the value-added application of eCommerce solutions to facilitate, integrate and streamline the entire procurement process – all the way from initial strategy development through contract placement to payment" (Laub 2001). Our e-procurement research programme adopts this broader view of e-procurement.

The National e-Procurement Research Project Australia (NeRPA) was initiated in 2003 in response to ongoing interest among the business and academic communities about the current status of e-procurement in Australian industries and organisations. Funded by a research grant from the Australian Government, the broad aim of the project is to assist Australian organisations to plan for, to implement and to assess the impact of IS-enabled innovations in procurement. A key element of the project is a series of national surveys of e-procurement adoption and implementation. The aim of the survey series is to establish the nature, extent and adoption profile of e-procurement within Australian organisations. In this paper we present the findings of the 2006 Australian National survey of e-Procurement. The paper is organised as follows. We begin with an overview of the survey objectives and the survey design followed by a presentation of the survey results. We discuss the findings and conclude with the implications for future research into IS-enabled innovations in procurement.

2 AUSTRALIAN NATIONAL SURVEY OF E-PROCUREMENT

2.1 Survey background and aim

The aims of the survey are to identify the drivers of e-procurement in Australian organisations; to understand the benefits and challenges that the adoption of e-procurement brings and to track how these change over time. A limitation of many existing surveys of e-procurement is that they are one-off events that present a useful snapshot at one point in time. The NeRPA surveys, part of a longitudinal study, are conducted biennially to enable us to identify and understand the impact of IS-enabled innovations in procurement and how these change over time. The first survey was completed in 2004 and the second survey (reported here) in 2006. Further surveys are planned for 2008 and 2010.

2.2 Methodology and Survey design

The NeRPA survey is designed around the OECD framework of maturity in electronic commerce markets which presents e-commerce maturity in terms of readiness, intensity and impact (Figure 1).

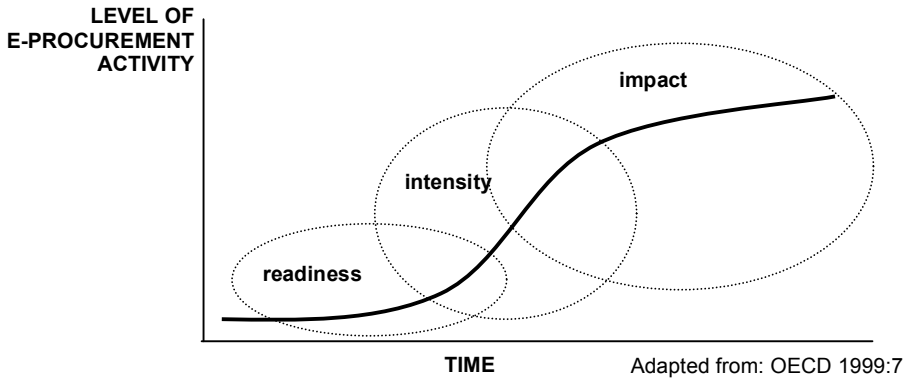

Figure 1: Framework for survey design

The OECD originally developed the framework to guide the definition and measurement of e-commerce and to assist in identifying and translating policy needs into research priorities (OECD 1999). Their goal was to bring about greater harmonisation of the research instruments used by nations to measure the economic and social impact of e-business as well as broader indicators of the information society. The framework and resulting definitions have guided a series of surveys and the aggregation of data from national statistical agencies. The focus of these surveys is primarily quantitative with national accounting and other economic indicators providing the basis for measuring the effects of e-business. For instance, economic data is gathered to measure, inter alia, the business use of IT (e.g. the uptake of ICTs, adoption of broadband communications etc), economic activity online (e.g. total value of Internet transaction – orders placed and orders received on line) and socio-economic indicators such as impact on jobs and skills and overall impact on employment. The efforts of the OECD (and other international bodies such as the UN) to harmonise e-commerce data collection have been relatively successful and whilst there is still no single uniform set of measures there is a significant subset of measures that allow for cross country comparisons. There is now authoritative and publicly available data on the impact of e-commerce at the national and industry level for most OECD and developed nations. Within these data sets is information about the supply-side of e-business such as the proportion of businesses placing orders online and the differences in e-procurement activity between industry sectors (cf. European Commission 2005b, ABS 2006, OECD 1999b 2002 2004). We use these data sources (e.g Australian Bureau of Statistics' Business Use of Information Technology and Economic Activity Surveys) to inform our work and provide the broader

economic context. Our research seeks to probe further and to identify e-procurement adoption patterns by activities, product types and technologies and to examine the organisational transformations and impacts of e-procurement. We therefore use the OECD framework to provide an analytical lens and to organise the survey structure as follows.

Readiness refers to the current use and potential levels of adoption of e-procurement by organisations. This concept is used to identify which particular e-procurement activities have been implemented; factors driving and inhibiting e-procurement initiatives; and planned levels of future activity.

Intensity reflects the nature of e-procurement activities and usage by organisations that are already procuring online. This concept is used to identify the types of activities, products and technologies that constitute e-procurement initiatives.

Impact refers to the ways (if any) in which e-procurement has transformed procurement in organisations. The concept addresses key outcomes from its use; major benefits obtained; challenges to further progress; and transformations arising from e-procurement initiatives.

The online survey was developed and administered in late 2005, early 2006. The core survey questions remain the same as those used in the 2004 survey; however in response to the 2004 survey findings and in order to incorporate emerging issues some new survey questions were included. Approximately 1000 members of the Chartered Institute of Purchasing & Supply Australia (CIPSA) were invited to complete the survey on behalf of their organisations. CIPSA members represent a broad range of industries and agencies in both the private and public sectors. We received complete responses from 139 organisations. These organisations span several industries across the public and private sectors, including government agencies, manufacturing, mining, health services, and education. Respondents include managers with responsibility for purchasing, e-procurement, and supply management. The survey findings are presented in the following three sections relating to the concepts of readiness, intensity and impact. Where available comparisons are made with the findings from the 2004 survey (shown in brackets).

3 E-PROCUREMENT READINESS

3.1 e-Procurement Adoption

Survey respondents reported on the current level of adoption and future intentions to adopt e-procurement in their organisations. The findings, set out in Table 1, indicate that 41% of respondents already procure online, a further 43% expect to initiate online procurement within the next one to two years, 16% have no plans to adopt e-procurement.

Level of adoption	Percent of Total Survey Respondents
Already procuring online	41%
Intend to procure online within the next 1-2 years	43%
No intention to procure online	16%

Table 1: Levels of e-procurement adoption

Medium to large size organisations constitute the majority of those who have adopted, or intend to adopt e-procurement in the next 1-2 years. This finding supports those of other surveys which suggest that the "likelihood of placing orders via the Internet increases with the employment size of businesses" (ABS 2006).

No-intention to adopt e-procurement

The most common reasons provided by organisations that have no current plans to implement e-procurement are the high costs of implementation; the size of the organisation (some organisations

believed they were too small to benefit from e-procurement); lack of management support and the complexity surrounding the nature and diversity of products and services to be procured.

3.2 Reach and scope of implementation

Of those who have already adopted an e-procurement initiative, the reach and scope of implementation is set out in Table 2. Compared with the 2004 survey, e-procurement implementations have broadened in reach and deepened in scope; more organisations now have fully operational systems that span the whole enterprise. In the 2004 survey we found a greater proportion of partial implementations.

Implementation Stage	Percent*
Experimented and not gone any further	4% (9%)
Partially implemented in one division	9% (24%)
Partially implemented in more than one division	9% (14%)
Partially implemented across the organisation	31% (23%)
Fully operational in one division	0% (1%)
Fully operational in more than one division	18% (8%)
Fully operational across the organisation	29% (21%)
*2004 survey results are shown in brackets.	

Table 2: Scope of e-procurement implementation

3.3 Strategic importance of e-procurement

Respondents who have implemented e-procurement were asked to rate the strategic importance of e-procurement in their organisation (Table 3). 74% of organisations that are already procuring online rated e-procurement as strategically important to extremely important. This finding is consistent with other studies that point to the increasingly strategic role of e-procurement (Laub 2001, Knudsen 2002).

Strategic importance of e-procurement	Percent
Extremely important	24
Important	50
Neither important nor unimportant	17
Unimportant	3
Extremely unimportant	6

Table 3: Strategic importance of e-procurement

3.4 Type of e-procurement/supply chain strategy

Respondents were asked to describe the e-procurement/supply chain management (SCM) strategy implemented in their organisation (Table 4). 87% of respondents have implemented an e-procurement strategy in their organisation, the majority (61%) having an e-procurement strategy that is integrated with their supply chain management strategy. This finding supports the earlier observation that e-procurement has increased in scope and is more integrated with other functions.

Type of e-procurement strategy	Percent
e-Procurement Strategy is part of our SCM Strategy	61%
Separate e-Procurement and SCM strategies	15%
e-Procurement Strategy only	11%
SCM Strategy only	2%
Neither	11%

Table 4: Type of e-procurement strategy

3.5 Factors driving the adoption of e-procurement initiatives

Both those organisations that already procure online and those who intend to procure online in the next 1-2 years were asked to identify the source of drivers of e-procurement. The findings are set out in Table 5 (implemented) and Table 6 (intend to implement). Management and customers were identified as the main source of drivers of e-procurement for both organisations who already procure online and those who intend to in the future.

Source of drivers	Percent
Driven by management	85%
Driven by customers	61%
Driven by suppliers	54%
Driven by competitors	44%
Driven by government requirements	33%

Table 5: Source of drivers of e-procurement (implemented)

Source of drivers	Percent
Driven by management	67%
Driven by customers	48%
Driven by suppliers	39%
Driven by competitors	30%
Driven by government requirements	20%

Table 6: Source of drivers of e-procurement (intend to implement)

The two groups were also asked to identify the factors driving the adoption of e-procurement in their organisation. The findings, set out in Table 7 (implemented) & Table 8 (intend to implement) indicate that for both groups the factors driving adoption of e-procurement continue to emphasise productivity gains and cost savings.

Factors driving adoption*
1. Reduce purchasing cost (2)
2. Improve productivity (-)
3. Improve efficiency (1)
4. Improve effectiveness (3)
=5 Improve internal & external customer service (-) =5 Standardise purchasing processes across the organisation (4)
*2004 survey results are shown in brackets

Table 7: Top 5 factors driving the adoption of e-procurement (implemented)

Factors driving adoption*
=1. Improve efficiency =1. Reduce purchasing cost
3. Standardise purchasing processes across the organisation
4. Reduce administrative costs
5. Improve effectiveness

Table 8: Top 5 factors driving the adoption of e-procurement (intend to implement)

3.6 Factors inhibiting the adoption of e-procurement initiatives

Tables 9 & 10 set out the top five inhibitors that are creating major hurdles for adopting and/or implementing e-procurement. Both groups identify a similar set of inhibitors. However the lack of supplier readiness was of greater significance to those organisations that are already procuring online,

who also identified a much broader range of inhibitors. Systems integration issues have been ranked higher in the 2005/2006 survey compared to the 2004 survey. This suggests that as organisations evolve toward a more strategic view of e-procurement (see Table 3) and implementations broaden in reach and deepen in scope (see Table 2) there are increasing challenges associated with integrating different systems and applications efficiently throughout the organisation (Mendoza et al. 2006). Finally, the inability to justify costs/benefits as an inhibitor for adoption focuses attention to broader considerations relating to benefits management and value creation in systems development in that benefits do not necessarily reside within the IT domain but incorporate changes in wider organisational activities; requiring changes to be identified and planned for and incorporate varying stakeholder expectations and roles (Tiernan & Peppard 2004; Dhillon 2005).

Inhibitors to adoption*
1. Lack of supplier readiness (-)
2. Systems integration issues (4)
3. Unable to justify costs/benefits (-)
=4. Auditability risks (-) =4. Implementation costs (3) =4. Inadequate technological infrastructure to support e-procurement (-) =4. Insufficient skilled staff (-) =4. Lack of management support (-) =4. Lack of supplier interest/support (-)
*2004 survey results are shown in brackets.

Table 9: Top 5 inhibitors of e-procurement adoption (implemented)

Inhibitors to adoption*
=1. Inadequate technological infrastructure to support e-procurement (-) =1. Systems integration issues (4) =1. Unable to justify costs/benefits (-)
=4. High implementation costs (3) =4. Lack of supplier readiness (1)
*2004 survey results are shown in brackets.

Table 10: Top 5 inhibitors of e-procurement adoption (intend to implement)

4 INTENSITY

4.1 Activities

Respondents were asked to identify the e-procurement activities used in their organisations. The top five activities are set out in Table 11. Activities associated with the placing, approval and tracking of orders remain in the top five most common e-procurement activities. Of note from the 2006 findings is the inclusion of invoicing and payments activities consistent with the move towards more fully operational systems (set out in Table 2) and the development of e-commerce capabilities.

e-procurement activities*
1. Online ordering (1)
2. Purchase approvals (2)
3. Payment (-)
4. Order tracking (3)
5. Invoicing (-)
*2004 survey results are shown in brackets.

Table 11: Top 5 e-procurement activities

4.2 Products

Respondents identified the goods and services most commonly procured online; the top five products procured are set out in Table 12. The 2006 findings are similar to those reported in 2004 although the rankings have changed and facilities management is included in the top five for the first time in 2006.

Products purchased*
1. Office supplies (4)
2. Computer related items (hardware & software) (5)
3. Maintenance and repair products (MRO) (2)
4. Products and services relating to inbound logistics and product distribution (i.e. inbound shipment handling and distribution, warehousing, etc.) (1)
5. Facilities management (-)
*2004 survey results are shown in brackets.

Table 12: Top 5 products purchased using e-procurement

4.3 Enabling technologies

Respondents were asked which e-procurement technologies and functions had been implemented in their organisation. The top five technologies are set out in Table 13. The most common technology applications in 2006 are the same as those reported in 2004 with the exception of e-tendering.

Enabling technologies
1. Online ordering systems (1)
2. Electronic payment (2)
3. Electronic catalogues (3)
4. E-tendering (-)
5. Order tracking systems (4)
*2004 survey results are shown in brackets.

Table 13: Top 5 technology applications used for e-procurement

5 IMPACT

5.1 Benefits of e-procurement initiatives

Respondents were asked to rate the benefits of e-procurement implementations to their organisation. Interestingly, none of the respondents who had implemented e-procurement reported major or significant benefits. The moderate benefits that were realised are set out in Table 14. These may be a consequence of timing, availability of information and/or inadequate evaluation practices. For example, it may be too soon after implementation of e-procurement for organisations to reasonably be able to identify benefits. Further, performance information may be unavailable or inaccessible due to the limited time since implementation, or lack of maturity in existing evaluation practices.

Benefits of e-procurement
1. Improved supply chain integration
=2 Reduced employee overhead =2 Improved supplier sourcing

Table 14: Top 2 benefits of e-procurement initiatives

5.2 Challenges to e-procurement initiatives

E-procurement implementations are also subject to challenges that can affect the further adoption or levels of diffusion. Respondents were asked to identify the major challenges to e-procurement implementation; the top five challenges are set out in Table 15. Issues relating to software and catalogue integration now rank as two major challenges facing organisations currently procuring online. These integration challenges are consistent with the increased reach of e-procurement implementation across the enterprise. Further, implementations are now deeper in terms of functionality thereby impacting a greater range of business processes and associated procurement practices across organisational boundaries. These changes are creating challenges in aligning organisational culture with new e-procurement practices.

Challenges
1. Software integration issues (-)
=2. Difficulties with catalogue integration (4) =2. Difficulty aligning organisational culture with e-procurement (-) =2. Coordinating inter-organisational information (2)
=5. Assessing cost/benefits (5) =5. Supplier readiness (1)
*2004 survey results are shown in brackets.

Table 15: Top 5 challenges to e-procurement initiatives

5.3 Transformations resulting from e-procurement initiatives

Transformations to business processes, work practices and supply-chain arrangements may occur as a consequence of the adoption of e-procurement. Respondents were asked to rate the impact of e-procurement on their organisation. The findings are presented below.

Staff costs: 60% of respondents indicated that staff costs have increased with 33% reporting no change. This finding is interesting in light of the previously noted benefit (Table 14), which indicates a moderate decrease in employee overhead. It appears that this is not the case for the majority of implementing organisations. Increases in staff costs may also be a consequence of the changing role of the procurement professional and the more strategic positioning of procurement within the organisation.

Staff development & training needs: 60% of respondents indicated that staff development and training needs have increased with 33% reporting no change. As above this increase in staff development and training needs is potentially a consequence of the changing role of the procurement professional and the requirement for practitioners with enhanced business analysis skills for strategic sourcing, supplier analysis etc.

Levels of outsourcing: 69% of respondents indicated that there had been no change in the levels of outsourcing with 29% reporting an increase.

Purchasing procedures: 69% of respondents indicated that purchasing procedures have become more efficient. This supports the earlier finding relating to e-procurement activities. The focus at this stage for the majority of companies has been on implementing and automating the purchasing activities themselves.

Strategic positioning of procurement: 69% of respondents indicated that procurement has become a more strategic activity within their organisation

Changes to technological infrastructure: 57% of respondents indicated that the technological infrastructure has changed significantly to accommodate e-procurement activities.

Inter-organisational information management: 62% of respondents indicated that inter-organisational information management (IIM) has improved significantly. This remains an area for further investigation as although IIM has improved respondents also noted that challenges still remain with coordinating inter-organisational information.

6 SUMMARY OF FINDINGS AND IMPLICATIONS FOR RESEARCH

The findings from the 2006 NeRPA survey are organised as four inter-related themes which present implications for the positioning of future research into IS-enabled innovations in procurement.

6.1 Strategic positioning of e-procurement

E-procurement has gained a more strategic position in organisations; 2006 survey respondents rated e-procurement as strategically important. Organisations are increasingly likely to have implemented an e-procurement strategy that is integrated with their supply chain management strategy. This finding supports the earlier observation that e-procurement has increased in scope, spanning the whole of enterprise and is more integrated with other functions. As e-procurement has become a more strategic activity within organisations the role of the procurement professional also appears to be changing. This is seen in the greater requirement for staff development and training to enhance business analysis skills in areas such as strategic sourcing and supplier analysis.

E-procurement involves efforts to change how procurement functions, such as spending and budgets, employing staff, buying goods and services, and managing technological and organisational activity are carried out. It also has the potential to transform the relations between suppliers and customers. However, while e-procurement is a label used globally, inscribed within its design may be a number of different assumptions and requirements relating to for example, technology, objectives, information, staffing and skills and institutional contexts. Therefore, its implementation may not be as simple as taking a design from one context into another one. Further insights are required into how IS enabled procurement innovation strategies are constructed and enacted in context.

6.2 Increased reach and scope of e-procurement implementations

Compared with the 2004 survey, e-procurement implementations have broadened in reach and deepened in scope. More organisations have implemented systems that span the whole enterprise and encompass a greater range of e-procurement functions and activities. For example, the inclusion of invoicing and payments in the top five e-procurement activities is consistent with the move towards more fully operational systems and the development of greater e-commerce capabilities. Consistent with, and a possible consequence of the increased reach and scope of e-procurement implementations is the emergence of integration and alignment challenges across the enterprise. Software and catalogue integration and the alignment of organisational culture with e-procurement present significant challenges to organisations who are currently procuring online.

Future research that adopts a broader definition and investigates inter-organisational aspects of e-procurement is required. This should also address policy issues (such as the design of enterprise wide policies for e-procurement) and risk management implications. For example, understanding the management of enterprise level risks associated with inter-organisational systems, such as the reliance on third parties to maintain service levels, minimize system disruptions and assure business continuity. Further there are risks associated with the security and availability of procurement information and matters of data protection and privacy. This is especially significant in situations where third party application service providers, who may be located in a different country or jurisdiction with differing applicable laws, are managing the organisation's e-procurement data and services.

6.3 Realising the benefits of e-procurement.

The benefits of e-procurement still remain largely unrealised by most organisations participating in the 2006 survey. Moderate benefits were realised with respect to improved supply chain integration, reduced employee overhead and improved supplier sourcing. It may be too soon after implementation for organisations to be reasonably able to identify benefits. Further, performance information may be unavailable or inaccessible. A number of the organisations that have implemented e-procurement identified a reduction in employee overhead as a marginal benefit. However they also indicate that staff training and development needs have significantly increased. Further, a shortage of sufficiently skilled staff was identified in the top five factors inhibiting e-procurement adoption. This is consistent with the heightened strategic importance of e-procurement, which may require different skill sets.

Although achieving cost and operating efficiencies are important, the main value added benefit of e-procurement may be derived from better information for strategic decisions and governance practices, which do not at this stage have much visibility. This requires further investigation.

6.4 Procurement information management.

Inter-organisational information management has improved significantly. This is consistent with the increased integration and range of e-procurement activities. However, coordination of inter-organisational information remains a major challenge. This may be a reason for organisations reporting difficulties in assessing e-procurement costs and benefits. Further, very few respondents reported they had implemented e-procurement evaluation methods, which may indicate that procurement information is not yet available or is inaccessible.

Improved procurement information is frequently claimed to be a perceived benefit in the research literature on e-procurement, however there are few empirical studies that investigate this phenomenon or establish the contribution of improved procurement information. There is a need for research to investigate and understand complex procurement information landscapes and to explore how procurement information is used to support strategic decision-making and operational improvement. This requires research that addresses the whole of the information lifecycle from identifying information users and information needs through creating, managing, monitoring, retention and disposition of the information assets.

7 CONCLUSIONS

In this paper we have reported on the findings of the 2006 Australian National Survey of e-Procurement. The survey series is structured around a well-established analytical framework and is part of a longitudinal series of surveys. A potential limitation of the survey is the response size; 14% of those invited to participate responded. The results show that e-procurement implementations have broadened in reach and deepened in scope compared with the 2004 findings. This change has resulted in greater adoption of invoicing and payment activities consistent with the move towards more fully operational systems and the development of greater e-commerce capabilities. This increase in reach and scope has also made the challenges associated with software and catalogue integration and the alignment of organisational culture with procuring online more visible. The findings of the 2006 survey indicate that whilst inter-organisational information management has improved significantly its coordination remains a major challenge for organisations. This may be a reason for organisations reporting difficulties in assessing e-procurement costs and benefits. The availability and accessibility of procurement information is critical in the monitoring and evaluation of procurement activities and as an input to strategic decisions surrounding procurement. This has been identified as a critical area requiring further investigation through in-depth case studies of organisational practices to understand the complex socio-technical change arising from IS-enabled innovations in procurement.

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